

What is claimed is:

1. A cooling device for cooling an object to be processed to a target temperature, comprising:

5 support means having a placing surface, for supporting the object on the placing surface;

temperature detection means provided to said support means, for detecting the temperature of the object on the placing surface to output temperature information of the object;

10 cooling means for cooling said support means to a ~~temperature lower than the target temperature~~ to cool the object on the placing surface;

15 heating means for heating the object cooled by said cooling means to a temperature almost equal to the target temperature; and

means for performing a switching operation between cooling by said cooling means and heating by said heating means on the basis of the temperature information from said temperature detection means.

20 2. A cooling device according to claim 1, wherein said cooling means has a first supply unit for supplying a first coolant having a temperature lower than the target temperature to said support means, said heating means has a second supply unit for supplying a
25 second coolant having a temperature almost equal to the target temperature to said support means, and the the switching means has means for causing said first

supply means to supply the first coolant until the temperature of the object becomes lower than the target temperature, then stopping supply of the first coolant, and causing the second supply means to supply the
5 second coolant.

3. A cooling device according to claim 2, wherein said first supply means has a freezer for cooling the first coolant and a coolant path which is formed in said support means and in which the first coolant
10 cooled by said freezer flows.

4. A cooling device according to claim 1, wherein said cooling means has a supply unit for supplying a coolant having a temperature lower than the target temperature into said support means to cool the
15 object to a temperature not higher than the target temperature, said heating means has moving means for removing the object cooled to the temperature not higher than the target temperature from said support means to expose the object in an atmosphere having a
20 temperature almost equal to the target temperature and to heat the object to the target temperature, and said switching means has means for causing said supply means to supply the coolant until the temperature of the
25 object becomes lower than the target temperature and then causing said moving means to remove the object from said support means.

5. A cooling device according to claim 1, wherein

said support means has a placing table having one surface and cooled to a temperature lower than the target temperature, and contact means, partially extending from one surface of said placing table and having one surface which is in contact with the object to rule the placing surface, for supporting the object such that the object opposes the one surface of said placing table with an interval.

6. A combination between:

a first cooling device, for cooling an object to ~~be processed to~~ a target temperature, comprising

a placing table having one surface,

support means, partially extending from one surface of said placing table, for supporting the object such that the object opposes one surface of said placing table with an interval,

temperature detection means for outputting temperature information of the object supported by said support means,

cooling means for cooling said placing table to a temperature lower than the target temperature to cool the object supported by said support means,

heating means for heating the object cooled by said cooling means to a temperature almost equal to the target temperature, and

means for performing a switching operation between cooling by said cooling means and heating by said

heating means on the basis of the temperature
information from said temperature detection means; and
a second cooling device, for cooling the object to
the target temperature, comprising

5 a placing table having one surface which is in
direct contact with the object to support the object,
temperature detection means, arranged in said
placing table, for detecting the temperature of said
placing table to output temperature information of the
10 object,

cooling means for cooling said placing table to a
temperature lower than the target temperature to cool
the object supported by said support means,

heating means for heating the object cooled by
15 said cooling means to a temperature almost equal to the
target temperature, and

means for performing a switching operation between
cooling by said cooling means and heating by said
heating means on the basis of the temperature
20 information from said temperature detection means.

7. A cooling method of placing an object to be
processed on a placing table to control the temperature
of the object to a target temperature, comprising the
steps of:

25 supplying a first coolant having a temperature
lower than the target temperature into said placing
table to cool the object; and

supplying a second coolant having a temperature almost equal to the target temperature into said placing table to heat the cooled object to the target temperature.

5 8. A method of selectively supplying a first coolant having a temperature lower than a target temperature and a second coolant having a temperature almost equal to the target temperature into a coolant path arranged in a placing table to cool an object to
10 be processed loaded onto said placing table to the ~~target temperature, comprising the steps of:~~

 supplying the second coolant into said coolant path in advance to set the temperature of said placing table at a temperature almost equal to the target
15 temperature; and

 supplying the first coolant into said coolant path the moment the temperature of said placing object is changed by loading the object onto said placing table or a predetermined time after the temperature of said
20 placing table is changed to cool the object, and supplying the second coolant into said coolant path again after the temperature of said placing table becomes a temperature not higher than the target temperature to heat the object to a temperature almost
25 equal to the target temperature.

 9. A method of loading an object to be processed onto a placing table by convey means and selectively

supplying a first coolant having a temperature lower than the target temperature and a second coolant having a temperature almost equal to the target temperature into a coolant path arranged in said placing table to cool the object to the target temperature, comprising the steps of:

supplying the second coolant into said coolant path before the object is loaded onto said placing table to set the temperature of said placing table at a temperature almost equal to the target temperature;

~~supplying the first coolant into said coolant path~~ when the object is loaded onto said placing table or a predetermined time after the object is loaded onto said placing table to cool the object; and

supplying the second coolant into said coolant path again after the temperature of said placing table becomes a temperature not higher than the target temperature to heat the object to the target temperature.

10. A method of receiving an object to be processed by delivery means on the upper portion of a placing table, moving downward said delivery means to place the received object on said placing table, selectively supplying a first coolant having a temperature lower than a target temperature and a second coolant having a temperature almost equal to the target temperature into a coolant path arranged in

said placing table to cool the object to the target temperature, comprising the steps of:

supplying the second coolant into said coolant path before said delivery means is moved downward to set the temperature of said placing table at a temperature almost equal to the target temperature;

supplying the first coolant into said coolant path when said delivery means is moved downward or a predetermined after said delivery means is moved downward to cool the object; and

supplying the second coolant into said coolant path again after the temperature of said placing table becomes a temperature not higher than the target temperature to heat the object to the target temperature.

11. A method of supplying a coolant having a temperature lower than a target temperature into a coolant path arranged in a placing table to cool the object loaded onto said placing table to the target temperature, comprising the steps of:

setting the temperature of said placing table at a temperature almost equal to the target temperature in advance; and

supplying the coolant into said coolant path when the temperature of said placing table is changed by loading the object onto said placing table or a predetermined time after the temperature of said

placing table is changed to cool the object, removing
the object from said placing table after the
temperature of said placing table becomes a temperature
not higher than the target temperature, and heating the
5 object to the target temperature in an atmosphere of a
temperature almost equal to the target temperature.

12. A method of loading an object to be processed
onto a placing table by convey means and supplying a
coolant having a temperature lower than the target
10 temperature into a coolant path arranged in said
placing table to cool the object to a temperature
almost equal to the target temperature, comprising the
steps of:

15 setting the temperature of said placing table at
the target temperature before the object is loaded onto
said placing table;

supplying the coolant into said coolant path when
the object is loaded onto said placing table or a
predetermined time after the object is loaded onto said
20 placing table to cool the object; and

removing the object from said placing table after
the temperature of said placing table becomes a
temperature not higher than the target temperature to
heat the object to the target temperature in an
25 atmosphere of a temperature almost equal to the target
temperature.

13. A method of receiving an object to be

processed by delivery means on the upper portion of
a placing table, moving downward said delivery means
to place the received object on said placing table,
supplying a coolant having a temperature lower than a
5 target temperature into a coolant path arranged in
said placing table to cool the object to the target
temperature, comprising the steps of:

setting the temperature of said placing table at
a temperature almost equal to the target temperature
10 before said delivery means is moved downward;

supplying the coolant into said coolant path
when said delivery means is moved downward or a
predetermined time after said delivery means is moved
downward to cool the object; and

15 removing the object from said placing table
after the temperature of said placing table becomes a
temperature not higher than the target temperature to
heat the object to the target temperature in an
atmosphere of a temperature almost equal to the target
20 temperature.

14. A cooling device for cooling an object to be
processed to a target temperature, comprising:

support means, having a placing surface, for
supporting the object on the placing surface;

25 cooling means for cooling said support means to a
temperature lower than the target temperature to cool
the object on the placing surface;

heating means for heating the object cooled by
said cooling means to a temperature almost equal to the
target temperature; and

5 means for performing a switching operation between
cooling by said cooling means and heating by said
heating means on the basis of data of cooling
characteristics.